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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/721,751	11/26/2003	Akihiko Shiina	K06-163744M/TBS	3940
21254	7590	04/07/2005	EXAMINER	
MCGINN & GIBB, PLLC 8321 OLD COURTHOUSE ROAD SUITE 200 VIENNA, VA 22182-3817			LUM VANNUCCI, LEE SIN YEE	
			ART UNIT	PAPER NUMBER
			3611	

DATE MAILED: 04/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/721,751

Applicant(s)

SHIINA ET AL.

Examiner

Lee Lum

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 January 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) all is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

1. An Amendment was filed 1/18/05 in which Claims 4-32 were also added.

2. Claims 11 and 17 are objected to because of the following informalities:

In Claim 11, "neighborhood range" should be "neighborhood region".

In Claim 17, "the electric power steering apparatus" lacks antecedent basis.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3, 4, 7, 10, 16-18, 21, 22, 26 and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Appleyard 6491131.

Appleyard discloses an electric power steering apparatus (fig 1) comprising

Driving gear/worm 13, and driven gear/worm wheel 12,

In which backlash between the two is set at least in a neighborhood region (or, first range of operation) of a steering neutral position region (c1, In 60-66; "driving straight ahead") as smaller than in a remaining region (or, second range of operation) (i.e., outside the "predetermined range of torque values"), via inclusion of (at least) element 14, and further,

The neighborhood region comprises a steering angular range on each side of the steering neutral position, as provided in c1, In 60-66; "over a predetermined range of torque values...[so] preventing gear rattle when driving straight ahead",

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wherein the remaining region comprises a steering angle that exceeds the steering angular range (c1, In 60-66, because this region is outside the "predetermined range of torque values...when driving straight ahead"),
Wherein a shaft center of the worm is offset from the worm wheel in an axial direction, via (at least) element 14, and,

The backlash changes gradually between the regions (inherent because the gears are fit, and adjusted, such as by elements 8,9,14, such that backlash is minimized; i.e., the gears correspond closely such that steering is generally smooth between "regions" of operation).

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

A. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Appleyard in view of Bucholz et al 6776064.

Appleyard does not disclose the driven gear as including a bias portion directed to decrease backlash, while Bucholz shows this characteristic in c5, first complete paragraph, where backlash may be decreased by "altering angles...by changing the dimensions and positioning of teeth 24,26, or...[by] skewing axes of rotation 16,20".

It would have been obvious to one with ordinary skill in the art at the time the invention was made to include this feature, as shown in Bucholz, to further decrease backlash between the gears, thus increase component longevity, and proper operation. The minimization of backlash between these gears is well-known for this objective.

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B. Claims 5, 6, 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Appleyard.

Re Claims 5 and 27, the reference does not disclose the steering angular range as comprising a substantially equal steering angle on each side of the neutral position. However, this feature would have been obvious in order to provide a steering transition between each side of the neutral position that is generally equally smooth between areas of operation, thus increase driver comfort.

Re Claims 6 and 28, the reference does not disclose the steering angle as comprising about 20 degrees of steering angle, but this feature is clearly application-dependent. The particular angle would be predetermined to achieve desired steering/handling characteristics. In this manner, it would have been obvious to one with ordinary skill in the art at the time the invention was made to include an appropriate steering angle to achieve certain desired steering characteristics.

C. Claims 11-15, 19, 20 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Appleyard in view of Higuchi 4475413.

Re Claims 11, 12, 19 and 20, Appleyard does not disclose either gear as including a bias portion that corresponds to a range of operation. Higuchi shows similar components of a power steering system including

In fig 2, driving gear 10 having bias portion 10c that corresponds to a certain range of operation, as provided in c3, In 14-39.

It would have been obvious to one with ordinary skill in the art at the time the invention was made to include this feature, as shown in Higuchi, to provide certain steering characteristics for a particular application.

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Re **Claims 13-15 and 23-25**, Appleyard does not disclose either gear as including a first radius of a pitch circle corresponding to a range of operation that is larger than a second radius corresponding to a remaining region. Higuchi shows this configuration in fig 2 with

Driving gear 10 having teeth 10a-10f with different pitch circles with respective correspondance, and as disclosed in c3, ln 14-39.

It would have been obvious to one with ordinary skill in the art at the time the invention was made to include this feature, as shown in Higuchi, to provide certain steering characteristics for a particular application.

D. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Appleyard in view of Kojo et al 6041887.

Appleyard does not disclose a motor with variable power assist, while Kojo shows motor 24 as controlled to output variable power assist, according to the range of operation (i.e., of the steering wheel), as provided in c5, ln 24-34, ln 52-56, c6, ln 53-63, etc). It would have been obvious to one with ordinary skill in the art at the time the invention was made to include this feature, as shown in Kojo, to provide improved steering handling, thus increase driver comfort. This feature is well-known for this objective.

4. Claims 8, 9, 29 and 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Prior art does not disclose the invention described above further including, *inter alia*, a specific algorithm involving characteristics of the gears.

5. The prior art made of record, and not relied upon, is considered pertinent to the disclosure: Appleyard 6725964, 6357313, Yanai 4444070, Jablonsky 4228696, Buck et al 4011764, Shimizu et al 6470994.

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6. RESPONSE TO REMARKS

Upon reconsideration, Examiner has provided new rejections, employing Appleyard in view of Bucholz, etc., for disclosing all recited elements.

7. Communication with USPTO/Examiner

Any inquiry concerning this communication, or others, should be directed to Ms. Lum at 571 272-6649, M-F, 9-6. If attempts to reach the examiner are unsuccessful, her supervisor, Ms. Lesley Morris is at 571 272-6651. Our fax number is 703 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for unpublished applications: private PAIR only, for published applications: private or public PAIR. For more information re PAIR: <http://pair-direct.uspto.gov>. Questions re access to the Private PAIR system should be directed to the Electronic Business Center (EBC) at 866 217-9197 (toll-free).

Ms. Lee S. Lum
Examiner
4/1/05

